XtremeSpectrum

Presentation to IRAC

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Company Overview

XtremeSpectrum

- Founded Q4 ’98 by recognized experts in UWB technology and radar applications
- Management team has in-depth technology and business experience in communication IC industry (design, manufacturing and marketing)
- Partners include industry leaders in consumer electronics, computing and networking
- First generation product development nearing completion
- Headquartered in Vienna, VA with Silicon Valley office in Mountain View, CA
- ***Product launch tied to regulatory approval***

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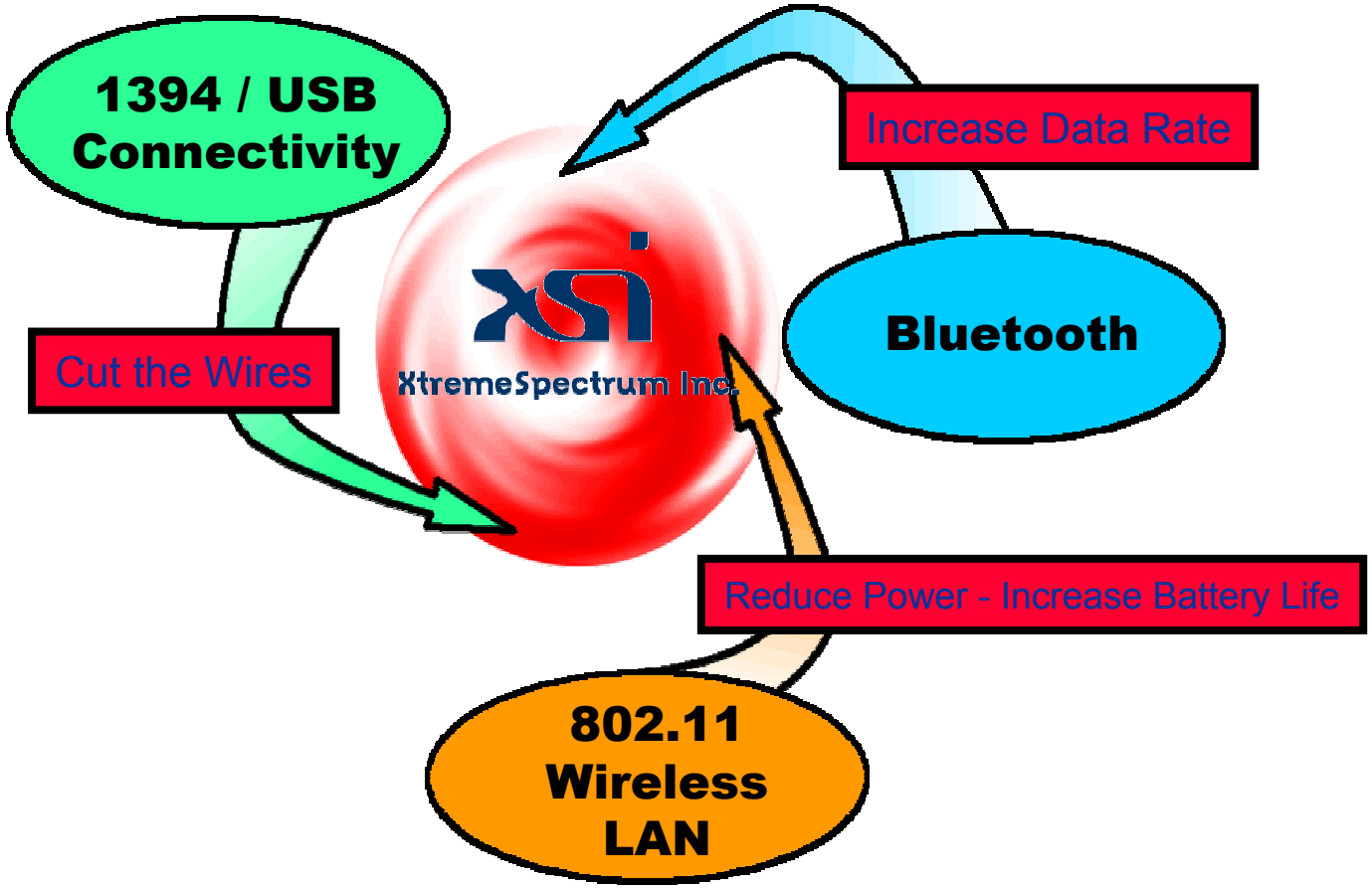
Reducing the Performance Differences between the Wireless and Wired Worlds for Multimedia-Intensive Devices



The Wireless Office Vision

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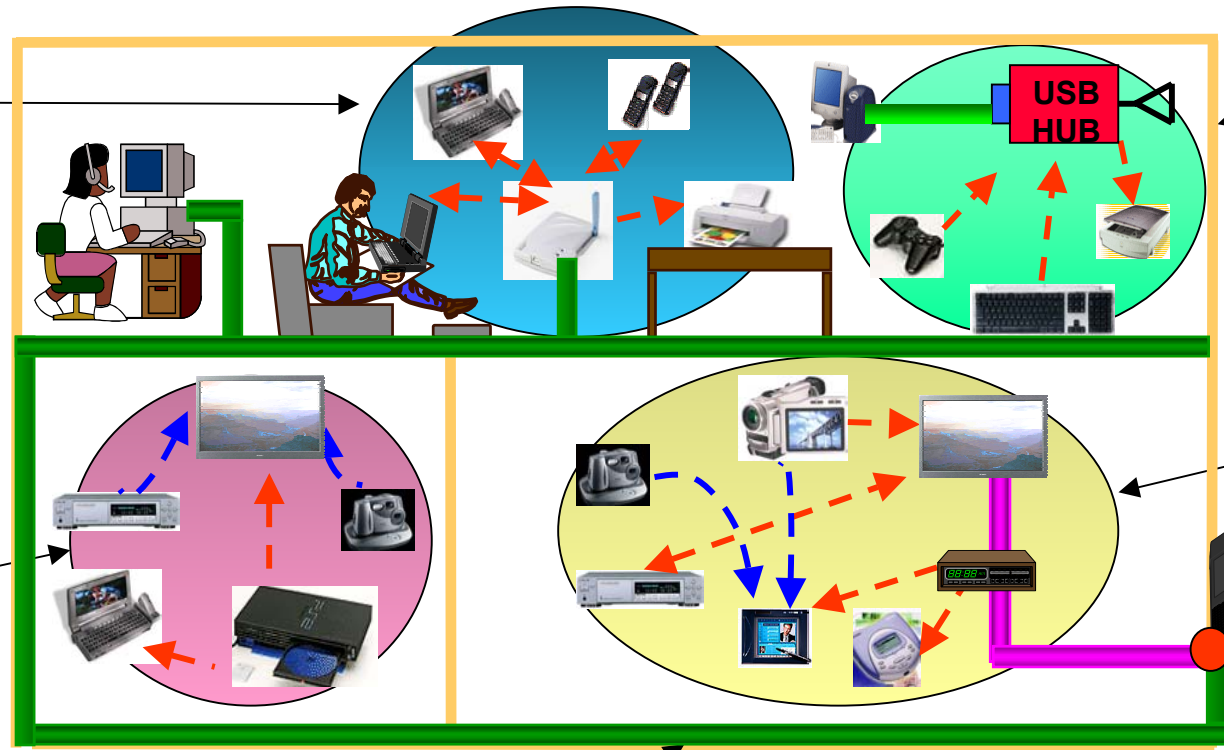

Office Cluster (infrastructure)

USB Cluster (ad-hoc) PC, printer, scanner, etc.

Office Multi-media Cluster (infrastructure-based)

Ad-hoc Video Conferencing Room

Network Gateway

Wired Backbone

UWB Applications: Transportation, National Security, Public Safety

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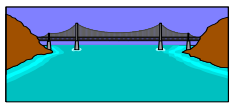
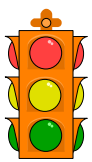
- Government and public safety users will benefit from innovations, cost reductions and economies of scale of commercial applications



- Automotive Radars
  -- collision avoidance
- Infrastructure Integrity Measurement

- Highway Inspection, Development and Construction
- Airport and Transportation Facilities Security

- Intelligent Transportation Systems
  -- toll booth collection, traffic warning systems



- Distributed Micro Sensors
  - Boarder Patrol, Smart Mines
- Public Safety, Police and Fire Fighter
  – Combined Location & Communications

Regulatory Review Has Been Long and Thorough

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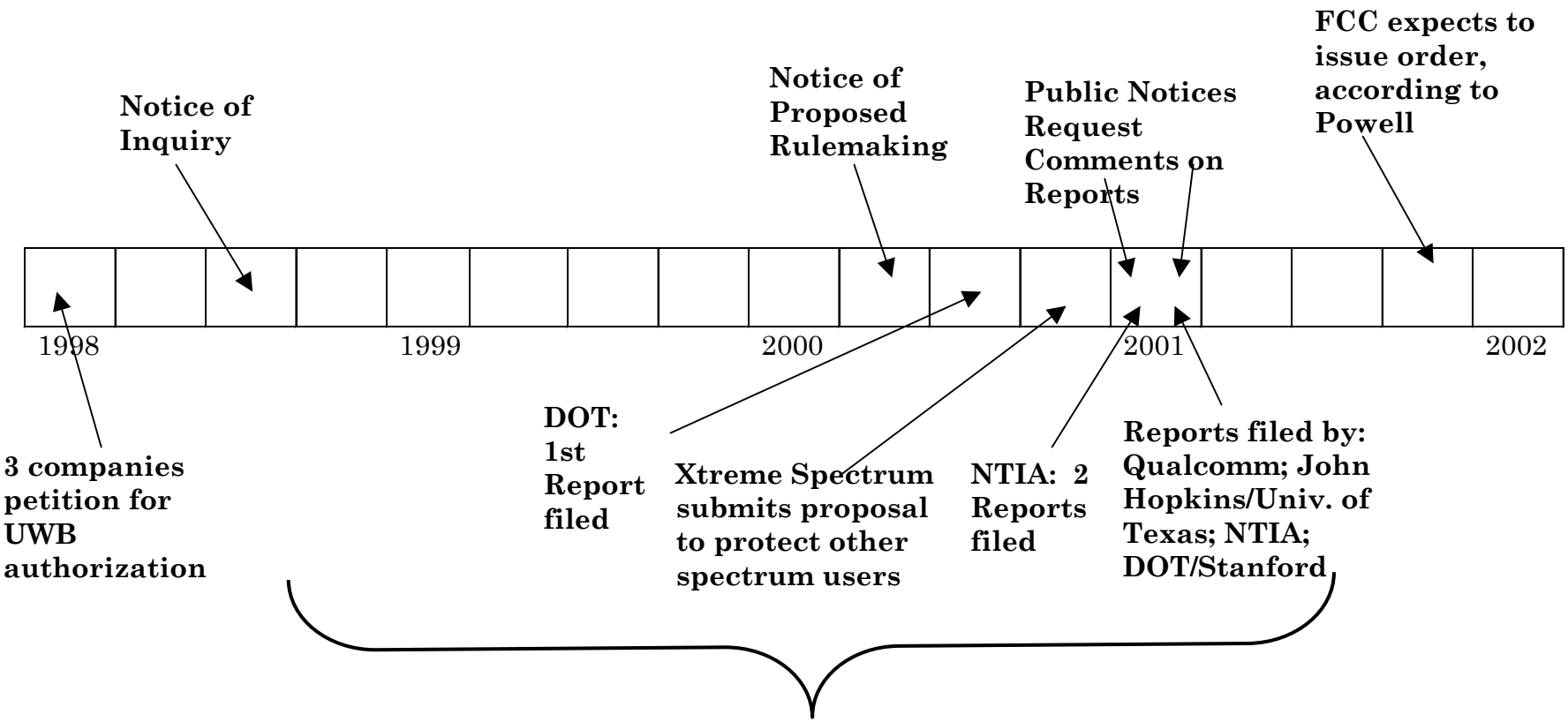
Regulatory Timeline of the UWB Proceeding



700+ submissions filed in the record.

Central Issue in this Proceeding is Interference

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- **XtremeSpectrum's proposal to limit interference:**
  - Limit emitted power in the more sensitive bands
  - Limit spectral lines in the GPS band
  - No outdoor tower or hard-mounted devices

- **Solves every interference question documented in the proceeding.**

Proposed Emission Limits Good for Outdoor Peer-to-Peer

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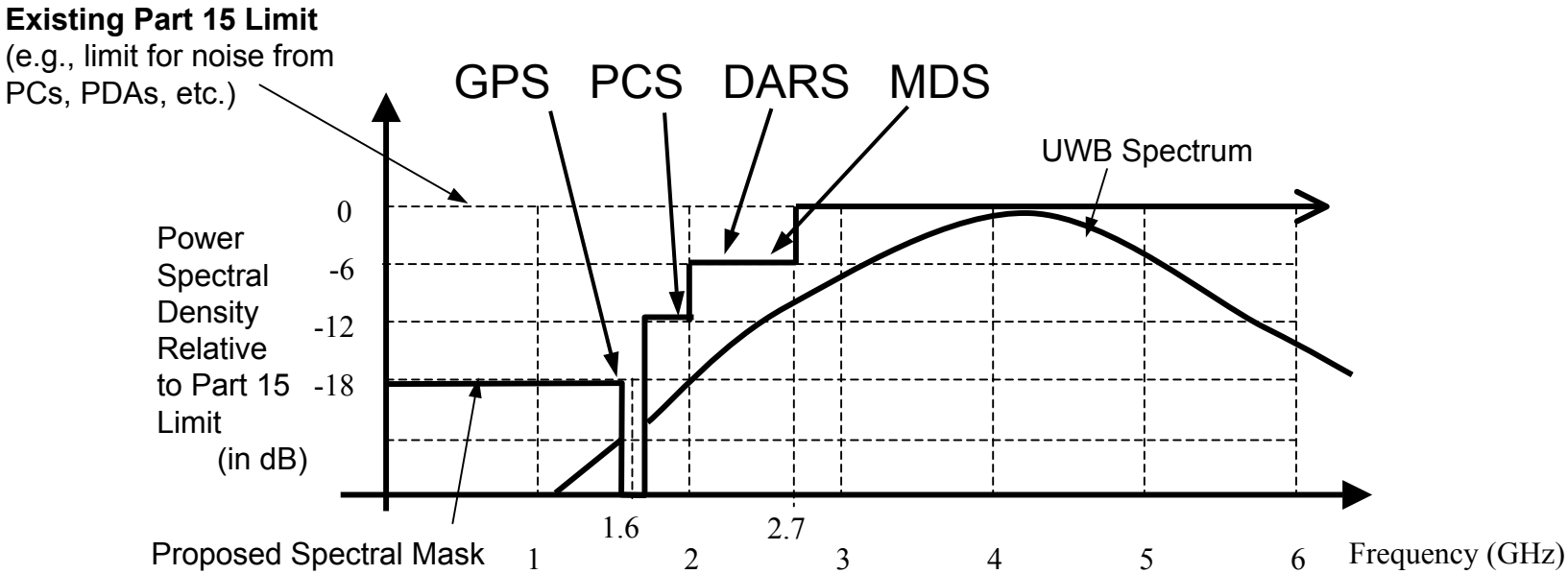

- Limits UWB emissions to levels below the NPRM
- XtremeSpectrum's modified proposal (09.10.01) to the FCC states it will not object to limits in the GPS band at 35 dB below Section 15.209(a) levels, plus an additional 10 dB suppression of spectral lines
- This proposal is consistent with limits demanded by the GPSIC

GPS

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- GPS can be completely protected with a deep notch
- RTCA's conservative analysis asked for –60 dBm/MHz for noise and –70 dBm/MHz for spectral lines
- GPSIC asked for –76.3 dBm/MHz protection for spectral lines
- XSI filed that it believed these were overly conservative but would not object.
- The analysis shows that this level is exceedingly safe

- ***GPS can be protected from outdoor UWB devices, both at ground-level and elevated heights***

UWB Companies MUST have products that don't interfere

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- **Good Business Practice**

  UWB Manufacturers could not stay in business if their products interfered with other radio services

- **UWB *will* coexist with GPS and PCS in portable devices**
  - Main Driver for Consumer Devices—Cell phones and PDAs
    - Networking capability is the driving force
    - UWB based networking cannot sacrifice connection to GPS and 3G
  - Main Driver for National Security and Public Safety applications
    - GPS again.

Aggregation Effects are Not a Threat

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- **Every study shows that UWB signals do not aggregate**
  - NTIA
  - FCC
  - XSI… Others
- **This is because propagation losses block the very low power UWB transmissions**
  - The signals attenuate much faster than they add up

Even if all the TVs in a hotel are playing, at most you might barely hear your immediate neighbors', but you don't hear any others -- and you certainly don't hear any of these TVs from anywhere outside the hotel, or from inside the hotel next door.

Technical Presentation Shows

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- **No Peer-to-Peer Restrictions are needed**
  -- A Simple Restriction On Tower Mounted UWB Devices is Plenty
  - Sound technical analysis supports that a spectral mask provides all the needed protection to allow UWB devices to operate outdoors.
- **Outdoor UWB at any height and scenario is safe for GPS**
  - Numerous reports and studies present a consistent picture of the interference mechanisms of UWB on GPS receivers
  - The 35 dB down from Class-B accomplishes the needed protection
- **Outdoor Class-B UWB at any height is safe for nearly all systems studied in NTIA report**
  - Assumptions that changed will be highlighted in following slides
- **Aggregation is not a factor**
  - Numerous reports and studies present a consistent picture showing the cumulative effects of multiple UWB devices are dominated by closest emitters
  - Experience from PC's is that aggregation is not an issue.
- **Emissions and Aggregation from a PC are representative**
  - UWB signals are similar from those of PC's and other typical radio signals.
  - If a device is not bothered by PC's, then it won't be bothered by UWB

Technical Presentation Outline

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- NTIA Study
  - SNR *not Noise Figure* as metric for harmful interference
  - Lack of Aggregation

Pg	GHz	System	Outdoor Limit	Limit Relative to Class-B
14	5.6-5.65	TDWR Terminal Doppler Weather Radar	– 41.3 dBm/MHz	0 dB
18	5.03-5.09	MLS Microwave Landing System	– 41.3 dBm/MHz	0 dB
20	3.7-4.2	FSS Fixed Satellite System Earth Station	– 41.3 dBm/MHz	0 dB
26	2.9-3.1	Maritime Navigation Radar	– 41.3 dBm/MHz	0 dB
32	2.7-2.9	NEXRAD Next Gen Weather Radar	– 41.3 dBm/MHz	0 dB
35	2.7-2.9	ASR-9 – Airport Surveillance Radar	– 41.3 dBm/MHz	0 dB
40	1.57542, 1.2276	GPS L1 & L2 Spectral Lines	– 70.0/-76.3 dBm	– 28.7/-35 dB*
49	1.544-1.545	SARSAT Local User Terminal (LUT)	– 70.0/-76.3 dBm	– 28.7/-35 dB*
52	1.24-1.37	ARSR-4 –Air Route Surveillance Radar	– 41.3 dBm/MHz	0 dB
55	1.025 – 1.15	DME Transponder (Ground Station)	– 59.3 dBm/MHz	– 18 dB

* - RTCA/GPSIC limits

- Other Topics
  - Similarities to Emissions from PC's
  - UWB does not imply spectral lines

Peer-to-Peer IS The Killer Application

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- **Peer-to-peer ban eliminates battery-operated communications. For example:**
  - Prevents two Palm users from exchanging business information
  - Prevents a user from downloading pictures from a digital camera to a laptop, Medical imagery transfers on portable equipment, etc.
  - Build wireless soldier communication/location/weapons systems
  - Build ad hock networks of micro-sensors for DOD, DOJ
- **Cuts into core consumer applications of UWB**
  - UWB loses its fundamental ability to significantly enrich performance of handheld devices
  - Reduced UWB applications prevent technology from taking off; undercuts economic benefit and potential for innovation
- **Restricts how manufacturers and end users can configure their networks**

Eliminating Peer-to-Peer Operation Is Too Severe

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- **Regulatory**
  - Analysis of potential for harmful interference shows that peer-to-peer usage is benign to all the NTIA systems evaluated in their report.
  - Notching GPS bands and applying a spectral mask below 3 GHz has been shown to be more than ample protection
  - A peer-to-peer ban is unjustified.

- **The problem with peer-to-peer bans is that they affect more indoor applications than outdoor ones**
  - Wireless makes no sense if it has to be “plugged in” to work.

RULES

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- Set appropriate emission limits
- Ban outdoor infrastructure
- Don’t restrict peer to peer
- Give manufacturers multiple regulatory options to maximize flexibility to innovate while protecting existing spectrum users
- XtremeSpectrum will comply with any reasonable set of limits that protects GPS

XtremeSpectrum Overview Summary

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- **Expeditious action is required for US to maintain leadership in this innovative wireless technology.**
  - UWB delivers ***high data rate*** and ***low power*** consumption at ***low cost*** to enable wireless media-intensive consumer electronics applications.
- **XtremeSpectrum has met all interference concerns raised in the docket.**
  - Good Business Practice – Customers demand full protection of other radio services, especially for functions in the same device.
- **A ban on peer-to-peer communications to enforce a total ban on outdoor use would significantly undercut utility, innovation and benefits to the economy.**
- **Appropriate yet flexible rules will both protect incumbents and facilitate a range of UWB technologies and proponents.**